PATENT SPECIFICATION (11) 1 403 765

1 403 765

(21) Application No. 50825/72 (22) Filed 3 Nov. 1972 (19)
(31) Convention Application Nos. 14109/71 (32) Filed 4 Nov. 1971
251 807 9 May 1972 in
(33) Sweden (SW)
United States of America (US)
(44) Complete Specification published 20 Aug. 1975
(51) INT. CL.² G07B 11/00 B42D 15/02
(52) Index at acceptance
G4T 1H
B6A 42A 42D
G4R 1X 9B

(54) IMPROVEMENTS IN OR RELATING TO THE IDENTIFICATION OF INDIVIDUALS

(71) I, ROLF ERIC ROTHFJELL, of Luntmakargatan 52, S-113 58 Stockholm, Sweden, of Swedish nationality, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to methods of and apparatus for establishing or checking the identities of individuals, and to identification cards suitable for such purpose.

The invention is particularly applicable to the checking of a person's identity, i.e. to ascertaining whether or not the person in question is the person he asserts himself to be, but extends to establishing the identity of an unknown person.

For such identification purposes, it has heretofore been a usual practice to use different identity cards provided with certain characteristic features peculiar to the preson in question. These cards are mainly intended for visual inspection, i.e. a controller decides by visual examination of the card whether or not the holder of the card possesses the identification features recorded on the card, although such cards can also be checked automatically. These known cards may therefore be provided with at least two separate forms of identification data, one for visual identification and one for mechanical identification.

It is highly desirable that it be possible to ascertain, either manually or by mechanical means, that an identity card

(a) is genuine and not a forgery

(b) has not been altered (had new characteristic features added thereto); and

(c) is not used by an unauthorized person.

To fulfil these requirements, the card should be equipped with a relatively large number of safeguards or security measures, which should not be so simple as to render it possible to forge a card or to enter the characteristic features of another person thereon.

It is sometimes desirable that the identity of a person can be checked by data machines. This is becoming more and more desirable with the increasing use of data machines, especially in such cases where it is necessary to ensure that only authorized persons have access to certain data stored in the machine. For this purpose, the method has been applied to provide each person concerned with a secret personal code, which upon request for information from the data machine is punched into the machine by the holder, at the same time as the machine is fed with other data on punched card or magnetic tape, for example, whereupon the data machine checks that the coded number inserted therein coincides with the information recorded on the punched card or tape. This method has the disadvantage that, in spite of all precautions, it is possible for unauthorized persons to obtain knowledge of a person's secret code number, together with other necessary information. Attempts have also been made to use the voice as an identification characteristic. However, the characteristics of the human voice are not constant, and when used for automatic identification purposes will not at times coincide sufficiently with the voice stored in the data machine. The use of finger prints has also been suggested, but they can be forged.

Thus, there is a need for identification means which can be readily stored in a data machine, in a manner such that the machine can compare the recorded identification means with the person himself or an image thereof presented to the machine. The identification means should be in the form of natural features of the person concerned, as opposed to an arbitrary digital or letter code or the like, the features being so individual as to exclude practically all risk of another person having identical characteristic fea-

tures. The features selected for identification means should be ones which remain constant for many years, preferably for the lifetime of the person concerned. The identification means should also be visible to the naked eye, to facilitate visual identification.

As mentioned above, attempts have previously been made to utilize special characteristic features of individuals for identification purposes. The features hitherto used, however, have been of a particularly simple nature and relatively easy to forge.

The facial features of a person naturally constitute good charactreistic data for identification purposes. With present day techniques, however, it is not practical, although possible, to store complete images of a person's face in a data processing machine. Further, it is also difficult to compare by means of data processing apparatus a complete image of a person stored in the apparatus with the person himself or with another complete image of said person.

According to a first aspect of the present invention, there is provided an identification card comprising at least one facial image of an individual and at least one curve characteristic of the image and located on a separate surface of the card from that on which the image is located, but superimposed on one side of the image in a position so that it corresponds to the associated curve in the image.

The identity card can be checked manually and/or mechanically.

According to a second aspect of the invention, there is provided in a method of establishing or rechecking the identity of an individual, the steps of defining from a facial image of an individual at least one curve characteristic of the individual, storing the characteristic curve, and comparing a facial image purporting to correspond to the individual with the stored curve to determine whether the stored curve coincides with a corresponding curve in the compared facial image.

According to a third aspect of the invention, the above method may be modified in that, instead of comparing a facial image of an individual with the stored curve, at least one curve purporting to identify an individual is compared with the stored curve to determine whether there is coincidence.

According to a fourth aspect of the invention, there is provided apparatus for establishing or checking the identity of an individual, comprising a computer having stored therein, for each of a plurality of individuals, data defining at least one curve characteristic of the individual and selected from at least one facial image of the individual, and at least one means associated with the computer for comparison of the face of an individual or at least one facial image of an individual with at least one stored curve retrieved from the computer.

According to a fifth aspect of the invention, there is provided apparatus for establishing or checking the identity of an individual, comprising a computer having stored therein, for each of a plurality of individuals, data defining at least one curve characteristic of the individual and selected from at least one facial image of the individual, and at least one means associated with the computer for comparison of at least one curve purporting to identify an individual with at least one stored curve retrieved from the computer.

The invention can be performed by photographing the face of the or each person concerned and deriving from the photograph a curve portraying, for example, the outer contours of the face. Although it is possible to use a single photograph, it is preferred to use several photographs, for example one photograph taken full face, one photograph in profile and one photograph taken at an angle of approximately 45° to the face, and derive curves from all photographs.

The invention will be more readily understood from a consideration of the following description, given purely by way of example, having reference to the accompanying drawings in which:

Fig. 1 illustrates a series of photographs;

Fig. 2 illustrates the series of photographs as illustrated in Fig. 1 portrayed on an identification card, but including examples of cards which can be derived from the photographs for identification purposes;

Fig. 3 shows the curves illustrated in Fig. 2 isolated from the remainder of respective photographs, and shows examples of different ways of sampling data for use in data processing apparatus in which the series of photographs is to be stored, and/or which is intended to identify said series and thus also the person concerned;

Fig. 4 partially schematically illustrates a data system for identifying a series of photographs such as those illustrated in Fig. 2 or the curves thereon; and

Fig. 5 partially schematically illustrates a system by which a person is identified directly.

With reference to the drawings, Fig. 1 illustrates a series of life-like photographs of a person, i.e. a series of conventional black and white photographs. In principle, the photographs can be taken with any suitable camera, using a conventional film, from which copies can be made in the normal manner. A suitable camera for the purpose is, for example, a camera of the type disclosed in U.S. Patent 2,868,095 and sold under the Trade Mark "Antenna". The film may be either black or white or colour film of normal senstivity, such as the well known

commercially available films produced by AGFA or "Kodak" (Registered Trade Marks) for example. The film is developed by conventional methods.

The series of photographs illustrated in Fig. 1 shows the same person in three different positions. The series comprises a full-face photograph 1, a photograph 2 taken at an angle of about 45° and a photograph 3 taken in profile. While the example illustrated herein comprises three views taken at different angles, it should be understood that any numebr of such photographs (from one on up) may be sufficient in various embodiments of the invention.

Fig. 2 shows the same series of photographs as illustrated in Fig. 1, but with certain curves accentuated by heavy lines, the curves following characteristic contours of the face in each photograph. Thus, curves 4, 5 and 6 are contour lines at the right hand portion of the facial image in each photograph 1, 2 and 3 respectively. In photograph 1, additional curves 7 and 8, characteristic of the face of the preson concerned, are accentuated in the same manner as curves 4, 5 and 6. Similarly, curves 9, 10 and 11 are accentuated in photograph 2 and curve 12 in photograph 3. In Figs. 2 and 3, the curves 4—12 have been inserted on the front surface of photographs 1—3. This can have a distracting effect on a person viewing the photographs and also hides the actual lines of the photograph. To overcome this disadvantage, the curves 4—12 are preferably inserted on the rear surface of the photographs 1—3. As will be evident from Figs. 1—3, the person concerned has been characterized by a number of curves which in the selected combination can only be found in the face of or images of the face of that particular person, who has consequently been specifically defined. Obviously, the number of curves can be in excess of that shown or can be less. A variation in the number of curves selected affords greater variation in the possibility of positive identification. In the aforedescribed manner, an original or master image is obtained which is suitable for derivation of and storing curves 4—12 in a data processing apparatus, for example a digital computer such as an IBM 370. "IBM" is a Trade Mark. The original may also be used as an identity card, as shown at 15 in Fig. 4, for example.

Although in most if not all cases the curves 4—12 will include no rectilinear portions, in some cases they may. The word "curve" should therefore be construed as covering the use of a curve having one or more substantially rectilinear portions.

The curves 4—12 can be taken from the photographs 1—3 by drawing in free hand on copies thereof, by photographic or xerographic high-contrast copying techniques, by electronic amplification of the contrasts in the photographs, or by means of a laser beam which can be guided by prominent contrasts in the facial image in the photograph. The important thing is that the curves 4—12 follow the intended contours with such accuracy that, at least when compared with the naked eye, they would seem fully identical therewith. Each curve 4—12 shall cover a sufficiently large portion of the contour line in question to substantially eliminate the possibility of similar curves being found on two persons.

When preparing an identity card for the person in question, the curves 4—12 can be inserted on the rear side of the photograph, whose front surface shows the three photographs 1—3, and covered with a layer of plastic material which is sufficiently translucent or transparent to allow visual inspection of the information in the card. For example any of the well known transparent plastics, such as polyesters like polyethylene or polyethylene terephthalate, may be used as an overcoating. In this way, it can be assured that the photographs present on the identity card actually belong thereto and have been altered or subsequently applied. The genuiness of the card may be checked by holding the card up to a light, whereby it can readily be ascertained whether the curves which should compare with corresponding contours on the photographs actually do so or not. Thus, it is virtually impossible to adopt the identity of the person to whom the card 16 was issued, simply by affixing one's own photographs above the curves.

The obtained curves 4—12, which are shown in Fig. 3 isolated from the remainder of the respective photographs, can also be readily stored in a data processing machine, for example by identifying any number of points on each curve by coordinate points in relation to suitably selected axes. Three dimensional curves may also be readily stored in a data processing machine, and it lies within the purview of the present invention to use three dimensional curves derived from three dimensional images such as holograms. Such curves can be stored in data processing apparatus, for example using an optical reader such as the commercially available IBM 1287 or IBM 1288 readers, the reading result of which can be fed into a data storage element in the computer apparatus. The curves can be read in horizontal and/or vertical steps, as indicated at 13 and 14 in Fig. 3, or in any other appropriate manner. Of course to preserve the integrity of the data memory bank, only authorized persons must be allowed to insert data into the computer memory.

Thus, the curve lines 4—12 shown in Fig.

3 represent the information stored in the memory of the data processing apparatus. The number of points selected on each curve is not critical, but — as will be readily understood — the closer together the points selected on the curve the more reliable the identification data.

The identity card 15, with the curves 4—12 disposed on the rear face of the photographs 1—3, or underneath the same, can also be checked visually. Thus, when one wishes to check the authenticity of the card vis-a-vis the holder, the checking authority, e.g. bank clerk, police, passport control, etc., need only compare the photograph on the card with the face of the person presenting the card, and then hold the card to light to ascertain whether the curves beneath the photographs coincide with the facial contours thereof.

Further, as will be apparent from the aforegoing description, the curves need not be recorded on the card itself, but can be stored in a data processing apparatus. Fig. 4 partially schematically illustrates a system with which the identity of a person can be checked by means of an identity card which does not itself include the aforementioned selected facial curves. In this instance, the identity card has affixed thereto a series of photographs 1—3 corresponding to those illustrated in Fig. 1, in addition to which there is preferably recorded thereon a personal identification marking 16 such as a personal account number, or any other desired personal data or information.

The card 15 used with the embodiment of Fig. 4, and lacking the facial curves, can be used for identification purposes in banks, shops and the like, where the cashier, for example, may make a visual comparison between the photographs 1—3 and the person presenting the card. For the purpose of checking that the photographs are genuine and that the card is not a forgery, the cashier inserts the card into a remote electronic reading and reproduced station, such as that depicted at 17, which is connected to a main data processing apparatus in which the characteristic curves 4—12 are stored. The reading and reproducing means may comprise, for instance, a reader portion 19 adapted to read the code numbers 16 on the card. The type of reading device used may be one for reading magnetic characters, wherewith the code number is written accordingly, or one which employs optical reading means, although any suitable read device may be used.

The reader portion 19 transmits the number sensed by it to the main data processing unit 18, which responds by transmitting data belonging to the person identified by the number 16 to a reproducing means 20 having a screen 21 both of which are a part of the remote unit 17. The data transmitted to the reproducing means 20 contains information relating to the curves 4—12 characteristics of the facial contours of the person concerned. The curves are then reproduced on the screen 21 of the reproducing means 20.

Thus, when one wishes to verify the genuiness of such a card, the card 15 is placed in the reader and reproducing means 17, with the photographs 1—3 lying on top of the screen 21, and the remote device is operated to initiate a read signal to the reader portion 19, whereupon the above sequence of events takes place. The curves reproduced and illuminated on the screen 21 may then be visually inspected through the card to determine if they coincide with the corresponding curves on the photographs 1—3 on the card.

The above described system can also be connected to account records terminals, so that the customer is able to use his identity card as a credit card, wherewith the cashier need only insert the item be recorded on the customer's account on a keyboard associated with the data processing apparatus 18, in which the customer's account data is also stored. In addition, the computerized system may include means for printing out a person's characteristic curves, or any other data, and such a print out system may be used to produce receipts or other records of each transaction made by an authorised individual.

In the aforementioned manner, it is possible to check in a simple manner — either with or without the help of data processing apparatus — whether or not the card was issued to the person presenting it. Obviously, if the characteristic curves inserted beneath the photograph or on the rear face thereof, or those displayed on a screen connected to a data system, do not coincide with corresponding facial curves on the photographs, it is likely that the card has been altered or is not genuine.

By combining the two above-described methods of illustrating the facial curves characteristic of the person concerned, e.g. by storing the curves both on the card itself and in the data processing unit 18, the data processing unit itself can be programmed to check the authenticity of the card. In this instance, the reader portion 19 of the reader and reproducing means 17 is provided with a read-out means, such as an optical read-out means corresponding to that discussed above, for reading the curves 4—12 for storage in the data processing unit 18. When checking the identity card presented by the person concerned, the cashier, for example, first visually checks that the features of said person are those reproduced in the pohtographs 1—3, whereafter the cashier places the card in the reader means of remote station 17.

The reader portion 18 then reads the curves and a comparison is made with the curves stored in the memory unit of the main data processing apparatus 18, this comparison being effected automatically in the data processing apparatus 18 which can thereby establish a person's right to obtain the desired information. In this respect, the memory register of the data processing apparatus is searched with the guidance of, for example, a personal number, account number or the like recorded on the card 16, or optionally with the guidance of a personal code which has been inserted in the remote station 17 in the afore-described manner, whereafter the data processing apparatus 18 compares the curves 4—12 on the card 15 with those in the data memory register. If the curves do not coincide, the data processing apparatus will not provide the information requested, and will refuse to effect the transaction. In addition, the curves present on any presented card may also be stored in a special register, thereby enabling subsequent checks to be made as to which persons have attempted to use the system under false pretences, which may be of value under certain circumstances, especially, for example, in police or private investigatory work.

In addition, the memory register of the data processing apparatus may be searched without the initial guidance of a personal account number or personal code. The data derived from the curves in the card may itself initiate the search of the memory register. After initiation, the search proceeds in accordance with the method already programmed in the data processing apparatus.

It is also possible to incorporate in the data processing apparatus the initial check that the curves coincide with corresponding contours on the photographs by providing the data processing apparatus with means which will enable it to sense both the photographs and the curves simultaneously in accordance with a predetermined program and to establish whether or not the curves do correspond.

It is not necessary to store the entirety of each curve in the series 4—12 in the data memory of the main data processing apparatus 18, but each curve need only be defined or represented by a predetermined number of points, the co-ordinates of which are stored in the memory. When reading an identity card in the reader portion 19, the result is transmitted to the main data processing apparatus 18 and need only be checked to ensure that the points stored therein satisfy said result.

In this instance, the reader portion 19 need only be constructed to read the curves 4—12 recorded on the card 15 along a one or more determined sensing lines, as exemplified by the lines 13 and 14 shown in Fig. 3. The number of scanning lines used, the point at which the scan is commenced and the direction of the sweep are all factors which can be varied as desired, which constitute key features in the identity code, and hence are also factors which should be maintained in secrecy insofar as is possible. The card may thus be checked according to either the on-line or the off-line technique. With all of the above-described mechanical checks, the card is read along one or more scanning lines. Each point at which the lines 13, 14 cross a curve line 4—12 can be allocated a numerical value, these values being suitably totalled together and used as a check number.

Further, it is possible with the aid of television cameras and optical systems for reproducing the curves 4—12 stored in the data processing apparatus 18, to make a direct comparison between the stored curves and the actual face of the person concerned. This can be effected by means of the data processing apparatus alone or by means of said apparatus together with the cooperation of the person involved.

Thus, instead of using an identity card it is possible to use the person concerned as the actual object for camparison with the characteristic curves 4—12 stored in the data processing apparatus. For instance, there may be arranged between the person concerned, e.g. the customer, and the cashier, a sheet of glass, for example, onto which the curve lines stored in the data processing apparatus can be projected. Projection of the curves onto the glass screen may be initiated by inserting the identification number submitted by the customer onto a keyboard at a remote station, whereupon the main data processing apparatus causes the curves to be projected in response thereto. The customer may then be asked to position himself before the glass screen to be aligned with fixed points corresponding, for example, to the position of the eyes, mouth, etc., whereupon the cashier is able to establish whether or not the curves on the screen coincide with corresponding curves on the face of the person concerned.

A corresponding and more positive identification can be provided by applying the techinque of direct identification as illustrated in Fig. 5 by training one or more television cameras on the face of the person concerned, whereby image signals are passed to monitors 24. The monitors 24 produce in principle an image similar to that illustrated in Fig. 1, wherewith the curves 4—12 on a certain number of points of the curves taken from the memory unit of the data processing apparatus can be superimposed on the respective monitors 24, so that the curves of said image on the monitors should coincide with the superimosed curves. In this way, there is obtained in the monitors 24 a view

similar to that illustrated in Fig. 2, or parts thereof, provided that the customer has given the correct identification number.

When using the systems described herein to establish the identity of an unknown person, it is of course necessary that a comparison be made between curves originating from the face of the person and a memory register containing curve lines originating from a number of known persons.

Performance of the present invention has been herein described with reference to the contours lines of the face of the person concerned, reproduced at one or more angles. However, other features than those illustrated and which are defined from a facial image can be used, such as the shape of the eyes, ears or mouth. Furthermore, if the outer contour line of the face is used, particularly prominent points on the face can be projected onto the outer contour line in accordance with predetermined rules and the especially pronounced points thus obtained, may provide further check possibilities.

Curves of the type used herein do not normally change with passing years, or at least only vary slightly, and may remain substantially constant throughout the lifetime of the person concerned. When such facial curves do change, however, for example as a result of an accident, plastic surgery, or serious illness, it will of course be necessary to rephotograph the face and replace the old curve lines with fresh ones taken from the more recent photograph.

It is again emphasized that the system described offer positive protection of the integrity of the person concerned, since the system can be applied in a manner such that no operations can be effected in the data processing apparatus without the presence of the person concerned.

WHAT I CLAIM IS:—

1. In a method of establishing or checking the identity of an individual, the steps of defining from a facial image of an individual at least one curve characteristic of the individual, storing the characteristic curve, and comparing a facial image purporting to correspond to the individual with the stored curve to determine whether the stored curve coincides with a corresponding curve in the compared facial image.

2. A method as claimed in claim 1, wherein a plurality of selected characteristic curves are defined from a plurality of facial images of the individual and stored, and a plurality of facial images purporting to correspond to the individual arc compared with the stored curves.

3. A method as claimed in claim 1 or 2, wherein the or each curve is stored in an identification card.

4. A method as claimed in claim 3, wherein the or each image to be compared with the or each curve is or are also stored in the identification card.

5. A method as claimed in claim 1 or 2, wherein the or each curve is stored in a data processor in the form of data defining the or each curve.

6. A method as claimed in claim 5, wherein the data is stored in a digital computer.

7. A method as claimed in claim 6, wherein the or each facial image to be compared with the or each curve is presented to means associated with the computer and the data defining a curve or curves stored in the computer is retrieved and presented for comparison with a corresponding curve or curves in the image or images.

8. A method as claimed in claim 7, wherein the data is presented to an optical projection device for visual comparison of the presented data with the facial image or images.

9. A method as claimed in claim 7 or 8, wherein the or each facial image to be compared with the curve or curves is stored in an identification card which is presented to the means associated with the computer.

10. A method as claimed in claim 9, wherein the means associated with the computer sends to the computer data representative of an individual identification marking on the card and the computer selects for comparison data defining a curve or curves associated with the identification marking sent.

11. A method as claimed in claim 6, wherein the or each facial image to be compared with the curve or curves is created from the individual himself by an instant access imaging device and data corresponding to a curve or curves stored in the computer is retrieved and presented for comparison with a corresponding curve or curves in the image or images.

12. A method as claimed in claim 11, wherein the or each facial image to be compared is created by at least one television camera.

13. A method as claimed in claim 11 or 12, wherein the data and the or each image are presented to an optical projection device for visual comparison.

14. A method as claimed in claim 11 or 12, wherein the imaging device sends data representative of the or each image to the computer and such data and the stored data are compared by the computer.

15. A method of establishing or checking the identity of an individual which includes defining from a facial image of an individual at least one curve characteristic of the individual, storing the characteristic curve, and comparing at least one curve purporting to identify an individual with at least one stored

curve to determine whether the curves coincide.

16. A method as claimed in claim 15, wherein a plurality of selected characteristic curves are defined from a plurality of facial images of the individual and stored, and a plurality of curves are compared with the stored curves.

17. A method as claimed in claim 15 or 16, wherein the or each stored curve is stored in a digital computer in the form of data defining the curve or curves and the or each curve to be compared with the stored curve or curves is stored on an identification card.

18. A method as claimed in claim 17, wherein the identification card is presented to reading means which reads the card and sends to the computer data defining the curve or curves stored thereon, and the computer compares the data stored therein with the data sent by the reading means.

19. A method as claimed in claim 18, wherein the reading means also sends to the computer data representative of an individual identification marking on the identification card and the computer selects, for comparison with the data defining the curve or curves on the card, data defining a curve or curves stored therein and associated with the identification marking sent.

20. A method of establishing or checking the identity of an individual, substantially as herein described with reference to Fig. 4 of the accompanying drawing.

21. A method of establishing or checking the identity of an individual, substantially as herein described with reference to Fig. 5 of the accompanying drawing.

22. Apparatus for establishing or checking the identity of an individual, comprising a computer having stored there, for each of a plurality of individuals, data defining at least one curve characteristic of the individual and selected from at least one facial image of the individual, and at least one means associated with the computer for comparison of the face of an individual or at least one facial image of an individual with at least one stored curve retrieved from the computer.

23. Apparatus as claimed in claim 22, wherein the means associated with the computer includes a display device arranged for visual comparison of at least one facial image of an individual with a curve or curves retrieved from the data in the computer.

24. Apparatus as claimed in claim 23, wherein the means associated with the computer is arranged to receive an identification card having thereon at least one facial image of an individual and the display device is arranged to display a curve or curves retrieved from the computer in alignment with the image or images on the card.

25. Apparatus as claimed in claim 24, wherein the means associated with the computer includes means for reading an identification marking on the identification card and for sending data representative of the marking to the computer, the computer being programmed to send to said means, for display, data defining a stored curve or curves associated with the identification marking sent.

26. Apparatus as claimed in claim 22, wherein the means associated with the computer includes a display device having a transparent display screen on which a curve or curves retrieved from the data in the computer can be projected for direct comparison with the face of an individual positioned in front of the screen.

27. Apparatus as claimed in claim 23, wherein the means associated with the computer includes means for creating at least one image of an individual there present.

28. Apparatus as claimed in claim 27, wherein the image creating means comprises at least one television camera.

29. Apparatus for establishing or checking the identity of an individual, comprising a computer having stored therein, for each of a plurality of individuals, data defining at least one curve characteristic of the individual and selected from at least one facial image of the individual, and at least one means associated with the computer for comparison of at least one curve purporting to identify an individual with at least one stored curve retrieved from the computer.

30. Apparatus as claimed in claim 29, wherein the means associated with the computer includes means for sending to the computer data defining the curve or curves purporting to identify an individual, the computer being programmed to carry out the comparison of such data with the curve data stored therein.

31. Apparatus as claimed in claim 30, wherein the means for sending data to the computer includes reading means arranged to receive an identification card and to obtain therefrom data defining the curve or curves purporting to identify an individual, which curves are stored on the card.

32. Apparatus as claimed in claim 31, wherein the reading means is arranged to obtain from the card further data representative of an individual identification marking on the card and the computer is programmed to compare the data sent from the means associated with the computer with that data stored therein which defines a curve or curves associated with the marking.

33. Apparatus for establishing or checking the identity of an individual, substantially as herein described with reference to Fig. 4 of the accompanying drawings.

34. Apparatus for establishing or checking the identity of an individual, substantially

as herein described with reference to Fig. 5 of the accompanying drawings.

35. An identification card comprising at least one facial image of an individual and at least one curve characteristic of the image and located on a separate surface of the card from that on which the image is located, but superimposed on one side of the image in a position so that it corresponds to the associated curve in the image.

36. An identification card as claimed in claim 35, which is sufficiently translucent for visual comparison of the characteristic curve with the corresponding curve in the image.

37. An identification card as claimed in claim 35 or 36, which contains identifying information concerning the individual whose image appears therein.

38. An identification card as claimed in claim 37, wherein said information is suitable for automatic reading.

39. An identification card substantially as herein described with reference to Fig. 2 of the accompanying drawings.

POLLAK, MERCER & TENCH,
Chartered Patent Agents,
Audrey House, Ely Place,
London, EC1N 6SN.
Agents for the Applicant.

Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1975.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY
from which copies may be obtained.

1403765 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

Fig. 2

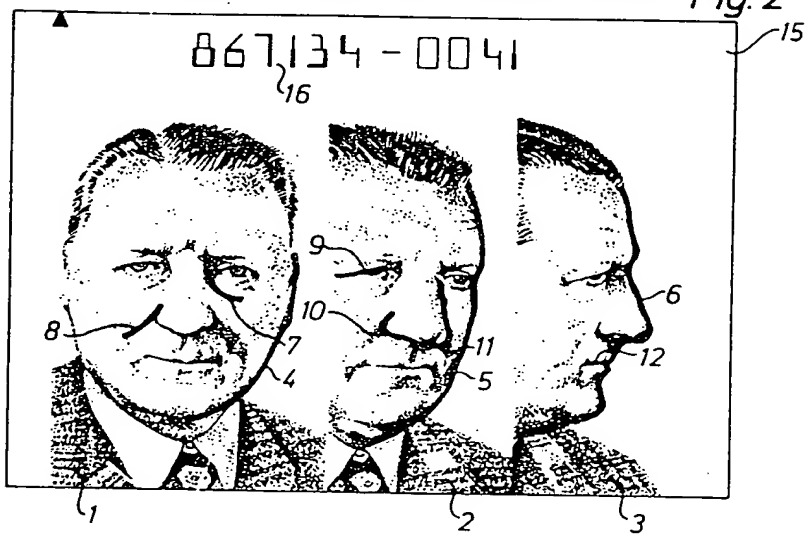
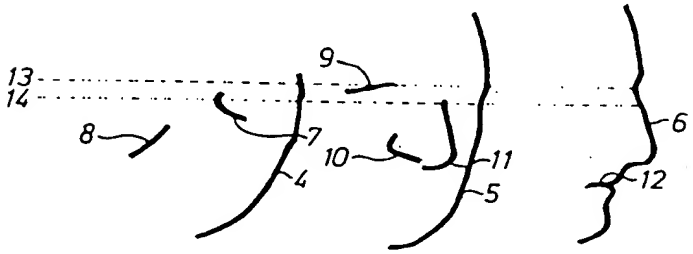


Fig. 3



1403765 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 2

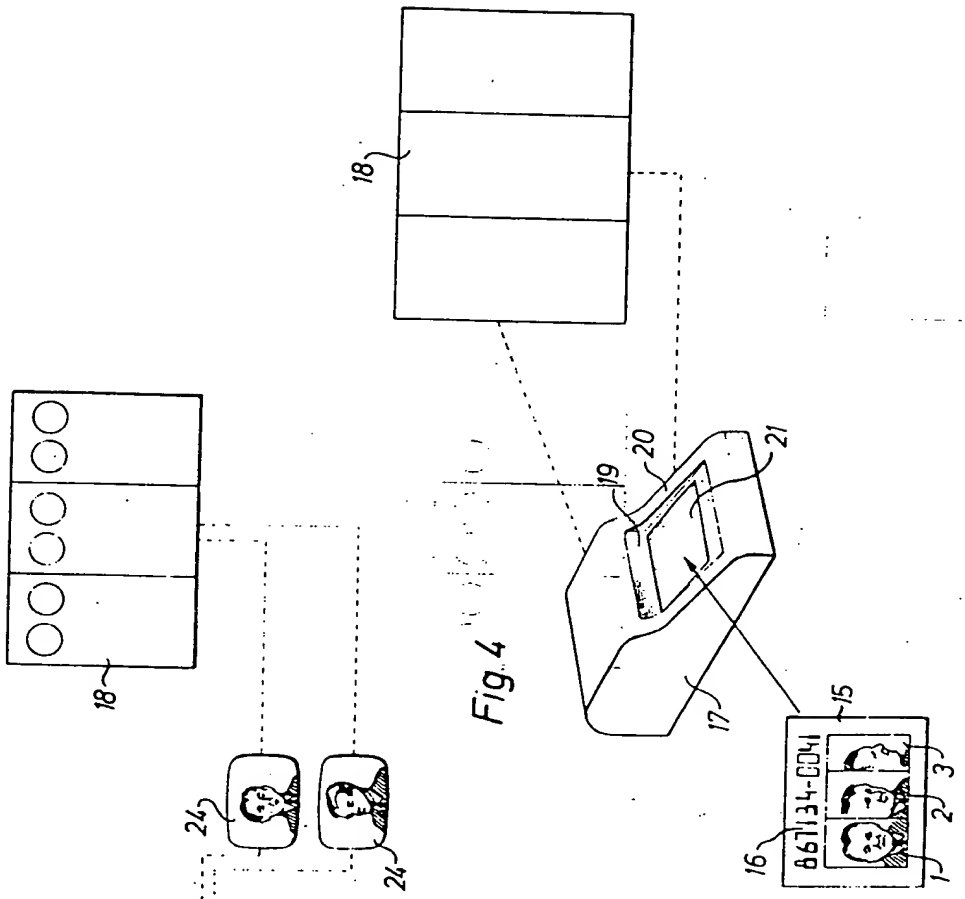


Fig. 4

Fig. 5